# Q-Switched High Power Single Frequency 2 Micron Fiber Laser, Phase II

Completed Technology Project (2009 - 2011)

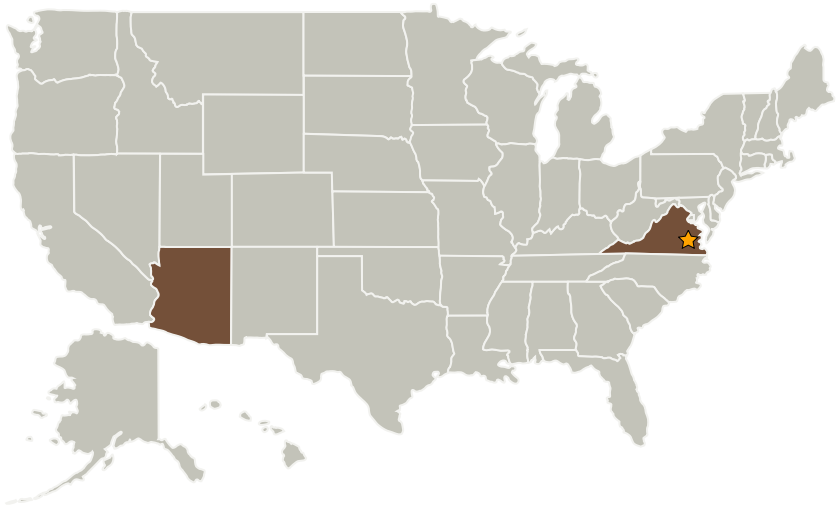
## Project Introduction

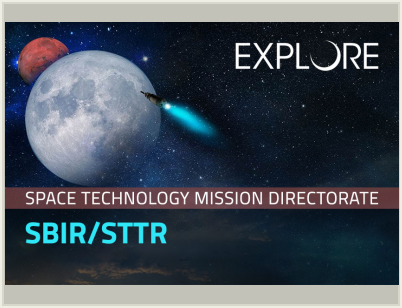
Accurate measurement of atmospheric parameters with high resolution needs advanced lasers. In this SBIR program we propose to develop innovative Q-switched high power 2.05micron fiber laser with pulse energy greater than 10mJ, repetition rate of 10Hz to 1KHz, and pulse duration of 200ns using our proprietary innovative highly efficient Tm-doped glass fiber. This new fiber laser will be an all-fiber laser system consisting of actively Q-switched fiber laser oscillator and fiber amplifiers. This proposed all-fiber laser system is compact, highly efficient, robust and highly reliable, which is especially suited for NASA's application where operating environment is always extremely rough. In Phase II we will further optimize Tm-doped glasses and fibers based upon Phase I results, design and engineer 2.05micron Q-switched single frequency fiber laser oscillator, design and engineer 2.05micron fiber amplifiers, integrate Q-switched single frequency fiber laser oscillator and fiber amplifier, build and deliver a prototype high power Q-switched single frequency 2.05micron fiber laser.

## Anticipated Benefits

There are a number of potential non-NASA commercial applications for Q-switched high peak power single frequency Tm3+-doped fiber laser. This eye-safe laser source can be used to build commercial lidar for ranging and surface topography applications, as the light source for generating mid-IR lasers, and for research and development.

## Primary U.S. Work Locations and Key Partners



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| Organizations Performing Work | Role | Type | Location |
|---|---|---|---|
| ★Langley Research Center(LaRC) | Lead Organization | NASA Center | Hampton, Virginia |
| AdValue Photonics, Inc. | Supporting Organization | Industry<br>Small Disadvantaged Business (SDB) | Tucson, Arizona |

| Primary U.S. Work Locations | |
|---|---|
| Arizona | Virginia |

## Project Transitions

**December 2009:** Project Start

**December 2011:** Closed out

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Center / Facility:**

Langley Research Center (LaRC)

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

**Project Manager:**

Farzin Amzajerdian

**Principal Investigator:**

Shibin S Jiang

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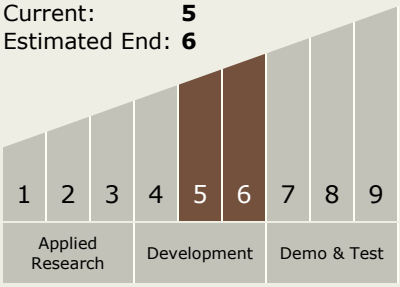
## Technology Maturity (TRL)

Start: **5**
Current: **5**
Estimated End: **6**




## Technology Areas

**Primary:**

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.5 Lasers